

SFM1 Sap Flow Meter

Product Overview

Is a self contained, stand alone instrument for the measurement of sap flow or transpiration in plants. Utilising the Heat Ratio Method (HRM) principle the Sap Flow Meter is able to measure both high and low flow rates in both small woody stems & roots as well as large trees.

Like the Heat Field Deformation (HFD) principle the HRM Sap Flow Meter is the only instrument that can measure zero flow and reverse sap flow rates. Making it the most powerful and flexible instrument for the direct measurement of plant water use.

The Heat Ratio Method

Developed by the University of Western Australia and partner organisations, ICRAF and CSIRO, the HRM principle has been validated against gravimetric measurements of transpiration and used in published sap flow research since 1998.

Burgess, S.S.O., et.al. 2001 An improved heat pulse method to measure low and reverse rates of sap flow in woody plants *Tree Physiology* 21, 589-598.

Heat Ratio Method (HRM) is an improvement of the Compensation Heat Pulse Method (CHPM). Being a modified heat pulse technique power consumption is very low using approx 70 m Amp per day at a 10 minute temporal sampling interval under average transpiration rates.



The HRM needles have two radial measurement points for the characterisation of radial sap flow gradients making measurements more accurate. Through microprocessor control, the inner measurement point can be activated or deactivated dependent on the specific wood anatomy of the species being measured. This provides a great flexibility in stem diameter range from >10 mm diameter woody stems or roots to the world's largest Redwood trees.

This enables water flows to be monitored in stems and roots of a wide range of different species, sizes and environmental conditions including, drought or water stress.



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SFM1 Specifications

Measurement		Features
Output Options	Raw Temperatures: °C Heat Pulse Velocity 60cm ³ cm ² hr ⁻¹ Sap Velocity: cm ³ cm ² hr ⁻¹ Sap Flow: Litres hr ⁻¹	Power Management <ul style="list-style-type: none"> • Internal Lithium-Polymer Battery • Power On/Off Switch • Internal Voltage Regulation • Optical Isolation Lightning Protection Logging <ul style="list-style-type: none"> • Stand-Alone logging • MicroSD Expandable Memory • USB Connectivity • Wireless Data Transfer • IP65 Rated Water Proof Enclosure Free Windows Utility Configuration Software
Range	-10 to +60cm ³ cm ² hr ⁻¹	
Resolution	0.01 cm ³ cm ² hr ⁻¹	
Accuracy	0.5 cm ³ cm ² hr ⁻¹	
Response Time	120 seconds	
Data		
Computer Interface	USB, Wireless RF 2.4 GHz	
Data Storage	MicroSD Card	
Memory Capacity	2GB expandable to 16GB	
Operating Conditions		
Heat Pulse	User Adjustable: 25 Joules (default) approx. Equivalent to a 2.5 second heat pulse duration, auto scaling. User Adjustable: Minimum interval, 3 minutes, recommended minimum 10 minutes.	
Power		
Power supply	850 mAmp Lithium Polymer battery	
Battery Life	A. 1 day at hourly logging interval @ 20 Joules B. Unlimited with optional 6W Solar panel	
Charging Voltage	12V DC	
Power Consumption	667 mA for 2.5 seconds (33mW)	
Dimensions		
Sensor Design	Probe Diameter: 1.3 mm Probe Length: 35 mm Thermocouples: 2 per probe	
Dimensions	Length: 170 mm Width: 80 mm Depth: 35 mm	
Weight	400 g	
Applications		
<ul style="list-style-type: none"> • Low & Zero Sap Flow Rates • Reverse Sap Flow Rates • Night Time Water Loss • Stem Sizes >10mm • Sap Flow in Roots • Arid Ecosystems & Drought • Radial Sap Velocity Profiles • Sap Flow of Grapevines 		
Accessories		
<ul style="list-style-type: none"> • SFT- Sap Flow Tool Software • MCC- Multi Converter Wireless RF Modem • HRM30- IK Installation Kit • HRM30- 55-HRM Replacement Drill Bits Size #55, pack of five drills • SX06- 6 Watt Solar Panel • SX10- 10 Watt Solar Panel • PDU- Power Distribution Unit 2 Watt Solar Panel and Integrated Battery 		



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